LODGEPOLE PINE

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Lodgepole pine is one of the most widespread softwood species in the Western United States and Canada. During the past quarter century its utilization has increased so greatly that it now nearly equals the cut of Western white pine. Lodgepole has the same soft-textured characteristics as ponderosa and the white pines and sometimes is substituted for them. It is used principally for framing material for light construction, for interior paneling, exterior trim, posts, poles, railway ties, and specialty items. Lodgepole pine has fine pulping properties and soon may be used heavily for manufacturing pulp and paper.

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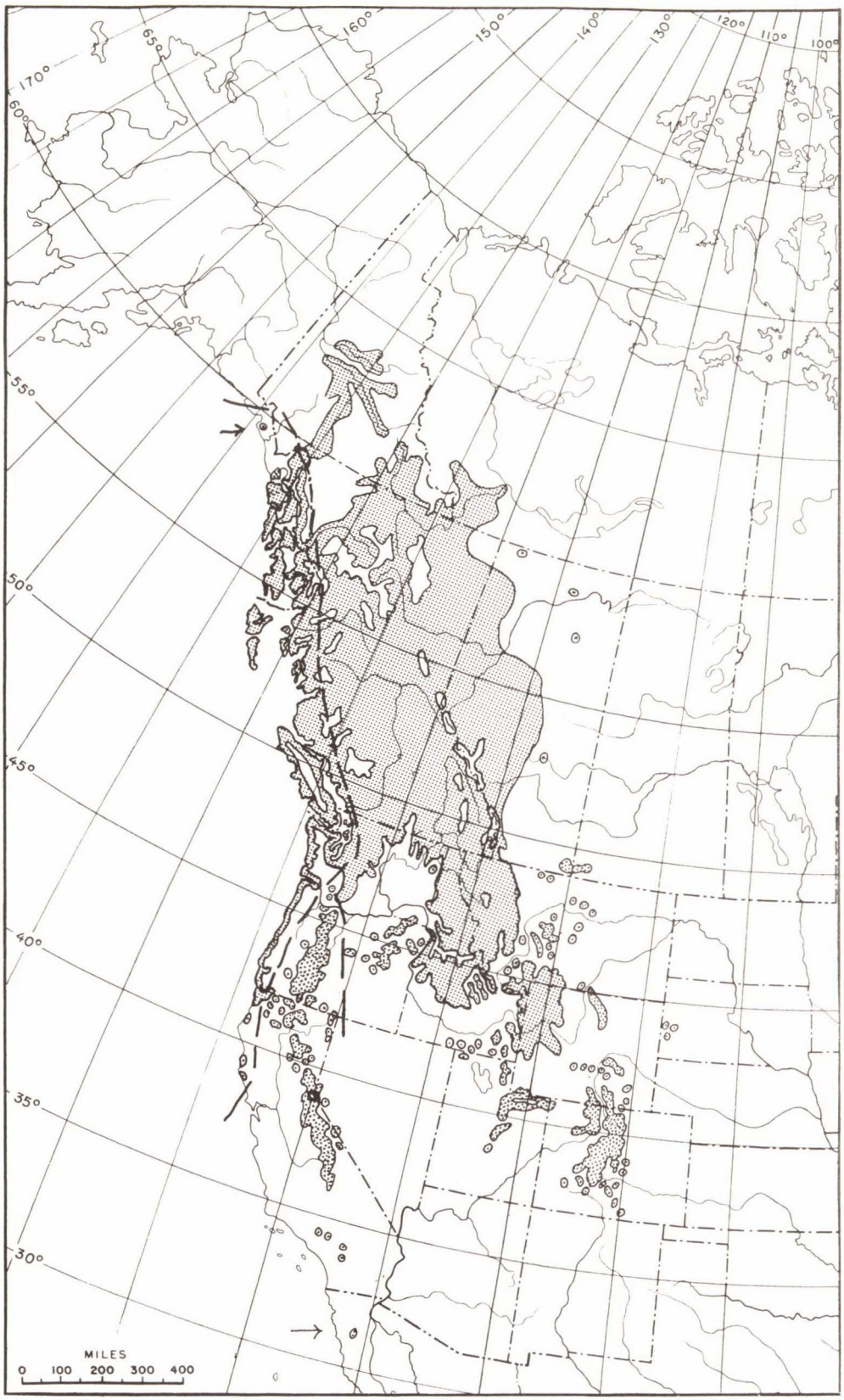

Figure 1.—The range of lodgepole pine in North America.

Cover—Lodgepole pine.
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LODGEPOLE PINE

(*Pinus contorta* Dougl.)

E. S. Kotok [1]

DISTRIBUTION

Lodgepole pine is one of the most widespread conifers in western North America. It grows from southeastern Alaska and the interior Yukon Territory south to northern Baja California and east to the Black Hills of South Dakota. Its northern limit is at about 64° N. latitude on the divide between the Klondike and McQueston Rivers; the southern limit is at about 31° N. latitude in the northern part of Sierra San Pedro Martir in Baja California (fig. 1).

Taxonomists often distinguish two varieties of lodgepole pine: the low, scrubby coastal form, *Pinus contorta* var. *contorta;* and the taller inland variety, *P. contorta* var. *latifolia.* Most of the commercially important lodgepole pine is the inland variety.

DESCRIPTION AND GROWTH

Needles in pairs, about 1½ inches long, are dark green (coastal form) to bright yellow green (mountain form) and are somewhat twisted. Cones about 1½ inches long, narrowly ovoid, often asymmetrical, commonly remain unopened for 10 to 20 years; cone scales have light yellowish-brown apophyses, each with a dorsal, minutely armed umbo; those near the base of the cone are knoblike. Bark is deeply furrowed (fig. 2) and transversely fissured (coastal form), or thin, scaly, and orange brown (mountain form).

Lodgepole pine grows on a wide variety of soils, but grows best on moderately acid, sandy, or gravelly loams that are moist, light, and well drained. It frequently occupies areas where soils are too poorly drained to support other local species. The coastal form of lodgepole grows from sea level to about 2,000 feet, but the inland form grows at elevations from 1,500 to 11,500 feet. In its most northerly range, including the Yukon Territory, the species grows on sites between 1,500 and 3,000 feet elevation; distributions increase to elevations between 7,000 and 11,500 feet in Colorado, and from 4,500 to 9,000 feet in Montana east of the Continental Divide. The species grows especially well on

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Figure 2.—Typical bark, needles, and closed cones of lodgepole pine.

northern and eastern aspects on gentle slopes and in basins, but is found on all types of terrain and all aspects.

Lodgepole pine produces some seed virtually every year and has abundant crops at 1- to 3-year intervals. Throughout much of its range inland, mature cones remain closed until temperatures reach or exceed 113° F. (45° C.); these temperatures may be caused by fire or solar radiation. Cones still closed after 80 years have yielded viable seed. When conditions favor cone opening, as in wildfires or in areas where serotiny (the closed-cone characteristic) is not a factor, lodgepole is likely to establish too many trees per acre to permit rapid growth of individual stems. As many as 300,000

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1-year-old seedlings have been found on a single acre, and as many as 175,000 8-year-old trees averaging about 2 feet high have been found on a single acre.

Lodgepole pine growth to varied sizes. In the moist Sierra Nevada Mountains, trees reach average breast-high diameters of 15 to 18 inches and average heights of 90 to 100 feet in 100 years. Within the main range, however, most trees at 140 years are 7 to 13 inches in diameter and 60 to 80 feet tall. The largest lodgepole pine on record, in Sierra National Forest, is nearly 6 feet in diameter and 106 feet tall. Conversely, stagnated 70-year-old stands have 100,000 trees per acre that average only 4 feet in height and 1 inch in diameter. Properly thinned stands can yield sawtimber volumes of 23 MBF per acre at rotation age 120 years, in contrast to unmanaged overstocked stands on similar sites that yield only 6 MBF per acre. The species seems to respond favorably to intensified management.

At high elevations, lodgepole pine grows in association with Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), red fir (*A. magnifica*), and whitebark pine (*Pinus albicaulis*). At lower elevations, it is found with Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), and other western coniferous species.

COMMON NAMES

Lodgepole pine is the most commonly used name, but the species is also known locally as black pine, scrub pine, shore pine, coast pine, tamarack pine, and jack pine.

RELATED COMMERCIAL SPECIES

Occasionally lodgepole pine is marketed in mixtures with ponderosa pine (*Pinus ponderosa*), Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*).

SUPPLY

The total stand of lodgepole pine of sawtimber size in the United States in 1963 was estimated to be 52,778 million board feet. Net volume of growing stock, including smaller trees, was estimated at 22,024 million cubic feet. These volumes grow chiefly on an estimated 15.8 million acres of commercial forest lands classified as lodgepole pine type. About 52 percent of the sawtimber volume is in the Northern Rocky Mountain region, 25 percent in the Southern Rocky Mountain region, 17 percent in the Pacific Northwest region, and 6 percent in the Pacific Southwest region. Montana has the greatest volume of lodgepole pine sawtimber and is followed, in decreasing order of volume, by Colorado, Wyoming, Oregon, Idaho, Utah, California, Washington, Alaska, and Nevada.

PRODUCTION

Production of lodgepole pine lumber and round products has steadily increased since 1945 after a half century of relatively little use (fig. 3). Data are not available for the entire species range, but production of posts, poles, mine timbers, and pulpwood for the seven Mountain States (Montana, Idaho, Wyoming, Utah, Colorado, Arizona, and New Mexico) in 1969 was estimated at:

	Thousand cubic feet
Posts	2,990
Poles	1,036
Mine timbers	1,139
Pulpwood	1,827
Total	6,992

The increasing use of lodgepole pine for pulp is significant because much of the wood is shipped from Montana and Idaho to mills in the Lake States and on the Pacific Coast. It is predicted that if a pulpmill is ever built in the heart of the lodgepole pine region, large volumes will be cut for this increasingly important product.

Lodgepole pine is highly susceptible to attack by several destructive insects and diseases. Chief insect pests are the mountain pine beetle (*Dendroctonus monticolae*), which has caused heavy losses in the United States and Canada; the lodgepole pine beetle (*D. murrayanae*), which chiefly attacks older and weakened trees; and the lodgepole pine terminal weevil (*Pissodes terminalis*), lodgepole pine needle miner (*Recurvaria milleri*), lodgepole sawfly (*Neodiprion burkei*), and the spruce budworm (*Choristoneura fumiferana*). Dwarfmistletoe (*Arceuthobium americanum*), and comandra rust (*Cronartium commandrae*) are the two most destructive diseases infecting lodgepole pine. Dwarfmistletoe, which is widespread, reduces growth significantly, lowers tree quality, and sometimes kills trees. Comandra rust is less widespread but kills more trees.

Lodgepole pine, because of its thin bark, is highly susceptible to fire kill. It is generally not windfirm, and overdense stands of small-stemmed trees may be damaged by heavy snow and ice. Porcupines may severely damage small young trees.

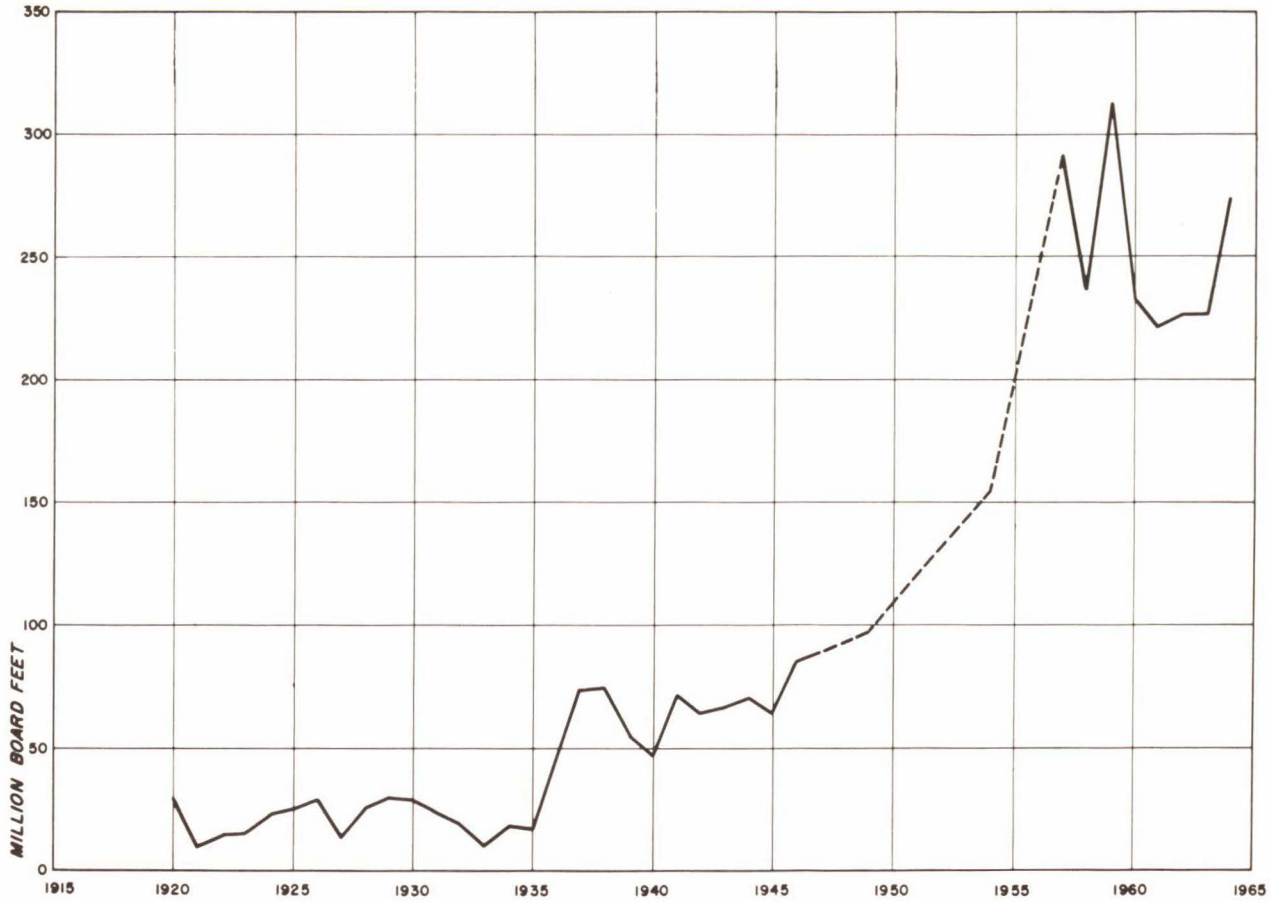

Figure 3.—Production of lodgepole pine lumber, 1920–1964.

CHARACTERISTICS AND PROPERTIES

The narrow sapwood is nearly white to pale yellow. The heartwood is light yellow to pale yellowish-brown, often scarcely darker than the sapwood and not clearly distinct. The wood has a distinct resinous odor, especially when green, but has no characteristic taste. It is generally straight but uneven-grained, medium-fine textured, and prominently dimpled on the tangential surface. The wood is moderately light in weight, moderately soft, moderately weak in bending and edgewise compression, moderately low in shock resistance, easy to work with tools, easy to glue, and average in paint-holding ability. The wood holds nails or screws moderately well, shrinks moderately but seasons easily. It is not durable under conditions that favor decay. Its weight, strength, shrinkage, and hardness are most nearly comparable to these properties in ponderosa pine. Lodgepole pine is especially useful in light frame construction for studs and truss members. It is also useful for cabinetry, shelving, and paneling where knotty material is specified. Because of its fine drying and gluing characteristics, it is useful for edge-glued panels of fairly large size.

Since lodgepole pine trees retain most of their limbs, most of the lumber sawn contains knots; but since limb size is generally small, so are the knots. When sawn in 1-inch boards, 85 percent of the lumber is generally graded No. 3 common or better. When sawn as 2-inch dimension, about 85 percent is standard or better.

Lodgepole pine in most areas grows straight with relatively little taper, but spiral grain may occur in some trees. Since the sapwood takes preservative treatment readily by all commercial methods, the tree is particularly useful for telephone or transmission poles and fenceposts, especially in small diameters and up to 45 feet in length. In 1969, 1.0 million cubic feet of poles was produced in the Rocky Mountain States alone. An additional 3.0 million cubic feet was used for posts and miscellaneous roundwood.

The long-term market for lodgepole in most western mining districts for mine timbers has declined in recent years because of changes in mining technology. Even so, 1,139 thousand cubic feet was used for mine timbers during 1969 in the Rocky Mountain States.

Because of its straightness, thin bark, and uniformly small size, lodgepole pine is especially well suited for pulpwood manufacture. Its properties make it a fine alternative for jack pine (*P. banksiana*) papermaking. In 1969, 1.8 million cubic feet from the Rocky Mountain States alone was used for pulpwood to supply mills in the Lake States, Inland Empire, and Pacific Northwest.

PRINCIPAL USES

Lodgepole pine was once used primarily for railroad ties, mine timbers, and locally for lumber, houselogs, or rough construction. Today, it is marketed worldwide as well-manufactured lumber both in board form and as dimension, especially 2x4, 8-foot studs. It is especially valued for knotty pine paneling because of its uniform color, small tight knots, and dimpled effect. When edge-glued, it is used for shelving, other cabinet work, or interior finish. It is used extensively for fence posts, corral poles, transmission or telephone poles, and to a limited extent, for pulpwood. It has been used experimentally for veneer and plywood.

REFERENCES

Baxter, Dow V.
1943. Pathology in forest practice. 618 p. New York: John Wiley and Sons, Inc.

Gill, Thomas G., and Phelps, Robert B.
1969. Wood used in manufacturing industries, 1965. USDA Forest Serv. Statist. Bull. 440. 101 p., illus.

Harlow, William M., and Harrar, Ellwood S.
1968. Textbook of dendrology. Ed. 5, 512 p., illus. Amer. Forestry Series. New York: McGraw-Hill Book Co.

Keen, F. P.
1952. Insect enemies of western forests. USDA Misc. Pub. 273. 280 p., illus.

Lotan, James E.
1968. Cone serotiny of lodgepole pine near Island Park, Idaho. USDA Forest Serv., Res. Pap. INT–52, 6 p., illus.

Lowery, D. P., and Kotok, E. S.
1968. Effects of natural tree characteristics on pole performance. Wood Pole Inst. Proc., Colorado State Univ., Fort Collins, Colo., pp. 156–163.

McGovern, J. N.
1958 (Rev.). Pulping of lodgepole pine. U.S. Forest Prod. Lab. Rep. R–1792.

Panshin, Alexis J., and DeZeeuw, Carl.
1964. Textbook of wood technology. Vol. 1. Ed. 2. New York: McGraw-Hill Book Co.

Steer, Henry B.
1948. Lumber production in the United States, 1799–1946. U.S. Dep. Agr. Misc. Pub. 669. 233 p.

USDA Forest Service.
1965a. Timber trends in the United States. USDA Forest Serv., Forest Res. Rep. 17, 235 p., illus.

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1965b. Silvics of forest trees of the United States. USDA Forest Serv., Agr. Handb. 271, 762 p., illus.

Wikstrom, John H.
1957. Lodgepole pine—a lumber species. USDA Forest Serv. Intermountain Forest and Range Exp. Sta. Res. Pap. 46. 15 p., illus.

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